Online Education and Video Communication Platform

Sridhar Kandi[1], Kalpak Kale[2], Mayur Nikhade[3], Bhavin Patel[4]

[1-4]Department of Computer Engineering, NBNSSOE, Pune

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Abstract - *In this rapidly growing world, the demand for online education and the conferencing platform has been increasing. With this platform, any individual can easily connect to others from any geographical location. So this type of platform helps to reduce cost and the efficiency of learning is increased because of negligible travel time. This demand even reached the apex of its necessity due to the Covid-19 pandemic. Considering this situation, we are going to develop a Web-based platform through which students can take online classes from any Geographic location. This will not only help students but it will also help teachers as they can address students present anywhere throughout the globe. This particular platform is being developed using WebRTC (Web Real-Time Communication) and Node.js. With WebRTC the real-time communication capabilities are added to our application. WebRTC works on top of an open standard. Node.js is a JavaScript RE that executes JavaScript code without the help of a browser.*

*Key Words***:** *Real-time communication, WebRTC, Node.js*

1. INTRODUCTION

The video conferencing web application is a solution that is used to overcome the limitations of the distance between different remote locations and provides a collaborative environment. WebRTC is a real-time communication technology that has a combination of API (Application Programming Interface) and real-time multimedia transfer such as video and voice available to a web browser without any plug-in components using JavaScript code. WebRTC supports various browsers such as Google Chrome and Mozilla Firefox. WebRTC holds Media Stream, Peer Connection, and Data Channels components API that can be integrated to create P2P direct media communication between peers. WebRTC's approach is like a WebSocket. But instead of a peer, WebSocket opens a pipe of connection with a server. These technologies are mostly used together for signaling purposes. WebRTC provides secured direct P2P communication between users and is free of plug-ins. WebRTC provides cost-effective and flexible means for real-time communication users.

2. WebRTC-ARCHITECTURE

Using WebRTC the connection between the peers get simple after the establishment of the various channel by the server between the two peers. The server does not involve itself in media display. It involves itself in the networking of sockets shown below figure(1).
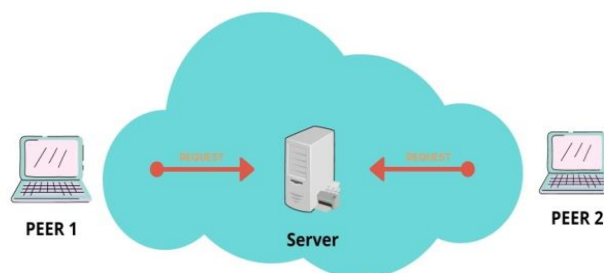

Fig -1: Client-Server Architecture

The server established the media channel and the audio channel, after the establishment the server just has to handle the networking which goes through HTTPS or through the Web Socket which helps to manage the network and alter the network when needed.
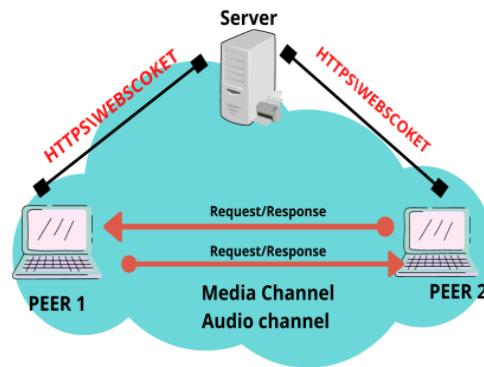
Fig -2: Client-Server Connection Establishment

3. WebRTC IN BROWSER

A Web application of WebRTC (mostly written as a mix of HTML and Java and JavaScript) and various Implementation methods used interaction with the various browsers (like Firefox, chrome, opera, safari, etc.) using the standardized WEBRTC API. The WebRTC API also provides various functions and methods to implement all the queries.

It manages the connection negotiations and regulators, the encoding and decoding of the media content, and the control over the firewall and the NAT element transversal. Communication Process is explained in the below figure(Fig.3:Communication process).
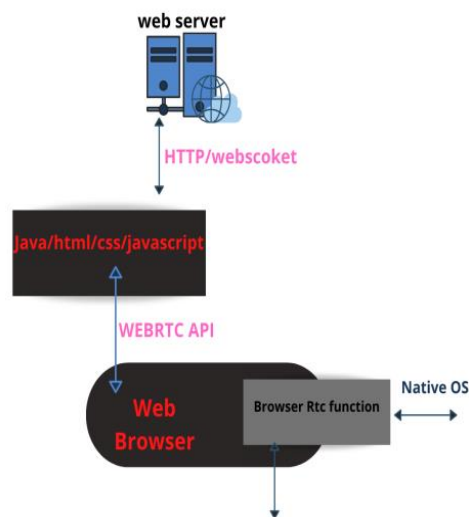

Fig -3: Communication Process

4. LITERATURE SURVEY

Author	Concept	Method	Advantages	Disadvantages
George Suciu, Marian Ceaparu, Stefan Stefanesc	Real-time communication (RTC) is an exchange of information over the internet, allowing access to information in areas like social media, chat, video conferencing, all over the internet. Examples: Video calls over mobile phones and laptops, voice calls over landlines and mobiles. WebRTC provides a Platform and device-independent application.	WebRTC	WebRTC provide Platform and device independent application. Provides Reliable Session Establishment.	WebRTC provide Platform and device independent application. Provides Reliable Session Establishment.
Aakash Decosta, Souvik Chakraborty, Dr. Asoke Nath, Nilanjan Chatterjee	In this paper, we are trying to build a system that has the capability of transferring text messages, files such as images, audio using the internet between 'n' number of users on the specified network in real-time. Firebase has the capability of handling most of the server-side works to develop a server-side application.	Firebase	Firebase provides a real-time database to store shared data. Firebase also provides Google analytics. Fast and Secure Web Hosting.	Very limited querying and indexing. No map-reduce.
George Suciu, Marian Ceaparu, Stefan Stefanesc	The vital role of this paper is to implement a multipoint video conferencing application using WebRTC. It focuses on : Low latency, higher speed, and low bandwidth support to the application. Reduce the cost of communication, and provides better security to the user data.	WebRTC	WebRTC is more secure and stable. Provides better sound quality. Adaptive to network conditions.	This is the fact that this platform is still under construction.
Stefan Stefanesc	In this digital era when time is considered the most valuable thing. The applications where real-time communication has to be implemented and scalability that requires continuous focus, Nodejs helps us with event-driven properties and non-blocking I/O mechanism.	Nodejs	Nodejs provides a fast and scalable platform for real-time application. It is capable of handling non-blocking I/O and asynchronous requests.	Reduces performance when handling Heavy Computing Task.
Radhika Patwardhan	Firebase is a Google-based API that acts as a real-time database for storing and fetching data quickly but firebase is much more than just a real-time database.	Firebase	Firebase provides features like Authentication, hosting, database storage, notification analytics.	Firebase has limited support for iOS features. Sometimes firebase leads to real-time synchronization.

5. CONCLUSION

Video conferencing serves many purposes like giving students responsibility for their learning and working in groups. With the availability of high-speed internet, it is expected that video conferencing will become popular. It will not only help students, but it also helps teachers to connect the students throughout the globe. Apart from this, the Video Conferencing application can be used in business applications and various health care sectors. Using Video Conferencing, there is a significant amount of reduction in the cost (travel cost) and increases productivity.

6. REFERENCES

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